

Union Calendar No. 75

107TH CONGRESS
1ST SESSION

H. R. 100

[Report No. 107–133, Part I]

To establish and expand programs relating to science, mathematics, engineering, and technology education, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

JANUARY 3, 2001

Mr. EHLERS (for himself, Mr. KOLBE, Mr. HORN, Mr. BACA, Mr. SANDLIN, Mr. CAMP, Mr. FILNER, and Mr. GIBBONS) introduced the following bill; which was referred to the Committee on Science, and in addition to the Committee on Education and the Workforce, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned

JULY 11, 2001

Additional sponsors: Mr. PETRI, Mr. ISAKSON, Mr. JENKINS, Mr. BARTON of Texas, Mrs. BIGGERT, Mr. SENSENBRENNER, Mrs. BONO, Mr. MOORE, Mr. SWEENEY, Mr. SHAYS, Mr. BEREUTER, Mr. DEAL of Georgia, Mr. BLAGOJEVICH, Mr. GREEN of Wisconsin, Mr. WHITFIELD, Ms. GRANGER, Mr. UPTON, Mr. ALLEN, Mr. BILIRAKIS, Mrs. JOHNSON of Connecticut, Mr. GUTKNECHT, Mr. FROST, Ms. MILLENDER-MCDONALD, Mr. STENHOLM, Mr. HOBSON, Mr. ENGEL, Mr. WELDON of Pennsylvania, Mr. WOLF, Mr. COX, Mrs. KELLY, Mr. GRUCCI, Mr. WELDON of Florida, Mr. CRAMER, Mr. CALVERT, Mrs. CLAYTON, Mr. MATHESON, and Ms. SANCHEZ

JULY 11, 2001

Reported from the Committee on Science with an amendment

[Strike out all after the enacting clause and insert the part printed in *italic*]

JULY 11, 2001

Referral to the Committee on Education and the Workforce extended for a period ending not later than July 11, 2001

JULY 11, 2001

The Committee on Education and the Workforce discharged; committed to the Committee of the Whole House on the State of the Union and ordered to be printed

[For text of introduced bill, see copy of bill as introduced on January 3, 2001]

A BILL

To establish and expand programs relating to science, mathematics, engineering, and technology education, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE.**

4 *This Act may be cited as the “National Science Edu-*
5 *cation Act”.*

6 **SEC. 2. FINDINGS.**

7 *Congress finds the following:*

8 *(1) As concluded in the report of the Committee*
9 *on Science of the House of Representatives,*
10 *“Unlocking Our Future Toward a New National*
11 *Science Policy”, the United States must maintain*
12 *and improve its preeminent position in science and*
13 *technology in order to advance human understanding*
14 *of the universe and all it contains, and to improve the*
15 *lives, health, and freedoms of all people.*

16 *(2) It is estimated that more than half of the eco-*
17 *nomie growth of the United States today results di-*

1 rectly from research and development in science and
2 technology. The most fundamental research is respon-
3 sible for investigating our perceived universe, to ex-
4 tend our observations to the outer limits of what our
5 minds and methods can achieve, and to seek answers
6 to questions that have never been asked before. Ap-
7 plied research continues the process by applying the
8 answers from basic science to the problems faced by
9 individuals, organizations, and governments in the
10 everyday activities that make our lives more livable.
11 The scientific-technological sector of our economy,
12 which has driven our recent economic boom and led
13 the United States to the longest period of prosperity
14 in history, is fueled by the work and discoveries of the
15 scientific community.

16 (3) The effectiveness of the United States in
17 maintaining this economic growth will be largely de-
18 termined by the intellectual capital of the United
19 States. Education is critical to developing this re-
20 source.

21 (4) The education program of the United States
22 needs to provide for 3 different kinds of intellectual
23 capital. First, it needs scientists, mathematicians,
24 and engineers to continue the research and develop-
25 ment that are central to the economic growth of the

1 *United States. Second, it needs technologically pro-*
2 *ficient workers who are comfortable and capable deal-*
3 *ing with the demands of a science-based, high-tech-*
4 *nology workplace. Last, it needs scientifically literate*
5 *voters and consumers to make intelligent decisions*
6 *about public policy.*

7 (5) *Student performance on the recent Third*
8 *International Mathematics and Science Study high-*
9 *lights the shortcomings of current K–12 science and*
10 *mathematics education in the United States, particu-*
11 *larly when compared to other countries. We must ex-*
12 *pect more from our Nation’s educators and students*
13 *if we are to build on the accomplishments of previous*
14 *generations. New methods of teaching science, mathe-*
15 *matics, engineering, and technology are required, as*
16 *well as better curricula and improved training of*
17 *teachers.*

18 (6) *Science is more than a collection of facts,*
19 *theories, and results. It is a process of inquiry built*
20 *upon observations and data that leads to a way of*
21 *knowing and explaining in logically derived concepts*
22 *and theories. Mathematics is more than procedures to*
23 *be memorized. It is a field that requires reasoning,*
24 *understanding, and making connections in order to*
25 *solve problems. Engineering is more than just design-*

1 *ing and building. It is the process of making com-*
2 *promises to optimize design and assessing risks so*
3 *that designs and products best solve a given problem.*
4 *Technology is more than using computer applications,*
5 *the Internet, and programming. Technology is the in-*
6 *novation, change, or modification of the natural envi-*
7 *ronment, based on scientific, mathematical, and engi-*
8 *neering principles.*

9 *(7) Students should learn science primarily by*
10 *doing science. Science education ought to reflect the*
11 *scientific process and be object-oriented, experiment-*
12 *centered, and concept-based. Students should learn*
13 *mathematics with understanding that numeric sys-*
14 *tems have intrinsic properties that can represent ob-*
15 *jects and systems in real life, and can be applied in*
16 *solving problems. Engineering education should reflect*
17 *the realities of real world design, and should involve*
18 *hands-on projects and require students to make trade-*
19 *offs based upon evidence. Students should learn tech-*
20 *nology as both a tool to solve other problems and as*
21 *a process by which people adapt the natural world to*
22 *suit their own purposes. Computers represent a par-*
23 *ticularly useful form of technology, enabling students*
24 *and teachers to acquire data, model systems, visualize*
25 *phenomena, communicate and organize information,*

1 *and collaborate with others in powerful new ways. A*
2 *background in the basics of information technology is*
3 *essential for success in the modern workplace and the*
4 *modern world.*

5 *(8) Children are naturally curious and inquisi-*
6 *tive. To successfully tap into these innate qualities,*
7 *education in science, mathematics, engineering, and*
8 *technology must begin at an early age and continue*
9 *throughout the entire school experience.*

10 *(9) Teachers provide the essential connection be-*
11 *tween students and the content they are learning.*
12 *Prospective teachers need to be identified and re-*
13 *cruited by presenting to them a career that is re-*
14 *spected by their peers, is financially and intellectu-*
15 *ally rewarding, contains sufficient opportunities for*
16 *advancement, and has continuing access to profes-*
17 *sional development.*

18 *(10) Teachers need to have incentives to remain*
19 *in the classroom and improve their practice, and*
20 *training of teachers is essential if the results are to*
21 *be good. Teachers need to be knowledgeable of their*
22 *content area, of their curriculum, of up-to-date re-*
23 *search in teaching and learning, and of techniques*
24 *that can be used to connect that information to their*
25 *students in their classroom.*

1 **SEC. 3. MASTER TEACHER GRANT PROGRAM.**

2 (a) *DEFINITIONS.—In this section—*

3 (1) *The term “sponsoring school” means an ele-*
4 *mentary or secondary school that employs a teacher*
5 *who is participating in a program funded in accord-*
6 *ance with this section.*

7 (2) *The term “nonclassroom time” means time*
8 *during regular school hours that is not utilized by a*
9 *master teacher for instructing elementary or sec-*
10 *ondary school children in the classroom.*

11 (3) *The term “master teacher” means a mathe-*
12 *matics or science teacher who works to improve the*
13 *instruction of mathematics or science in kindergarten*
14 *through 9th grade through—*

15 (A) *participating in the development or re-*
16 *vision of science, mathematics, engineering, or*
17 *technology curricula;*

18 (B) *serving as a mentor to mathematics or*
19 *science teachers at the sponsoring school or other*
20 *schools;*

21 (C) *coordinating and assisting teachers in*
22 *the use of hands-on inquiry materials, equip-*
23 *ment, and supplies, and when appropriate, su-*
24 *pervising acquisition and repair of such mate-*
25 *rials;*

1 (D) providing in-classroom teaching assist-
 2 ance to mathematics or science teachers; and

3 (E) providing professional development, in-
 4 cluding for the purposes of training other master
 5 teachers, to mathematics and science teachers.

6 (4) The term “mathematics or science teacher”
 7 means a teacher of mathematics, science, engineering,
 8 or technology in an elementary or secondary school.

9 (b) PROGRAM AUTHORIZED.—(1) The Director of the
 10 National Science Foundation shall establish a program to
 11 award competitive, merit-reviewed grants to institutions of
 12 higher education (or consortia thereof) to train master
 13 teachers and assist elementary and secondary schools to de-
 14 sign and implement master teacher programs.

15 (2) Institutions of higher education receiving grants
 16 under this section shall offer programs to train master
 17 teachers. As part of such programs, a grantee shall—

18 (A) recruit and select teachers to receive train-
 19 ing;

20 (B) ensure that training covers both content and
 21 pedagogy;

22 (C) ensure that participating teachers have men-
 23 tors; and

1 (D) assist participating teachers with the devel-
2 opment and implementation of master teacher pro-
3 grams at their sponsoring schools.

4 (3) Grants awarded under this section may be used
5 to—

6 (A) develop and implement professional develop-
7 ment programs to train elementary or secondary
8 school teachers to become master teachers and to train
9 existing master teachers;

10 (B) provide stipends and reimbursement for
11 travel to allow teachers to participate in professional
12 development programs in the summer and throughout
13 the year;

14 (C) provide guidance to sponsoring schools to en-
15 able them to develop and implement a plan for the
16 use of master teachers;

17 (D) support participating teachers during the
18 summer in research programs conducted at institu-
19 tions of higher education, private entities, or govern-
20 ment facilities;

21 (E) provide educational materials and equip-
22 ment to master teachers;

23 (F) provide computer equipment and network
24 connectivity necessary to enable master teachers to
25 collaborate with other master teachers, to access edu-

1 *cational materials available online, and to commu-*
2 *nicate with scientists or other mentors at remote loca-*
3 *tions; and*

4 *(G) fund any other activities the Director deter-*
5 *mines will accomplish the goals of this section.*

6 *(c) SELECTION PROCESS.—(1) An institution of high-*
7 *er education seeking funding under this section shall submit*
8 *an application at such time, in such manner, and con-*
9 *taining such information as the Director may require. The*
10 *application shall include, at a minimum—*

11 *(A) a description of which classroom subjects and*
12 *grade levels the training will address;*

13 *(B) a description of the activities to be carried*
14 *out, including—*

15 *(i) how such activities will be aligned with*
16 *State and local standards and with other activi-*
17 *ties that promote student achievement in mathe-*
18 *matics and science; and*

19 *(ii) how such activities will be based on a*
20 *review of relevant research and why such activi-*
21 *ties are expected to strengthen the quality of*
22 *mathematics and science instruction;*

23 *(C) a description of how the applicant will en-*
24 *sure the active participation of its mathematics,*

1 *science, or engineering departments in the develop-*
2 *ment and implementation of the program;*

3 *(D) an explanation of how the program will en-*
4 *sure that teachers are given instruction in both con-*
5 *tent and pedagogy;*

6 *(E) a description of how the applicant will re-*
7 *cruit teachers to participate in the program and the*
8 *criteria that will be used to select the participants;*

9 *(F) a description of the type and amount of any*
10 *financial assistance that will be provided to teachers*
11 *to enable them to participate; and*

12 *(G) a description of how the applicant will work*
13 *with schools to ensure the success of the participating*
14 *teachers.*

15 *(2) In evaluating the applications submitted under*
16 *this subsection, the Director shall consider, at a*
17 *minimum—*

18 *(A) the ability of the applicant to effectively*
19 *carry out the proposed program;*

20 *(B) the experience the applicant has in devel-*
21 *oping and implementing high-quality professional de-*
22 *velopment programs for mathematics or science teach-*
23 *ers; and*

1 (C) the extent to which the applicant is com-
 2 mitted to making the program a central organiza-
 3 tional focus.

4 (3) In evaluating the applications submitted under
 5 this subsection, the Director shall give priority to those ap-
 6 plications that demonstrate the greatest participation of
 7 mathematics, science, or engineering departments.

8 (d) *TEACHER ELIGIBILITY.*—(1) To be eligible to par-
 9 ticipate in a program funded under this section, a mathe-
 10 matics or science teacher shall submit to the Director, at
 11 such time and in such manner as the Director may require,
 12 an assurance executed by the sponsoring school, that, after
 13 completing the program funded by this section, the partici-
 14 pating teacher will be provided sufficient non-classroom
 15 time to serve as a master teacher. A copy of this assurance
 16 must be submitted to the institution of higher education as
 17 part of the teacher's application to participate in the mas-
 18 ter teacher program.

19 (2) No funds authorized by this section may be used
 20 to train any teacher who has not complied with paragraph
 21 (1).

22 (e) *ACCOUNTABILITY AND DISSEMINATION.*—(1) The
 23 Director shall evaluate the activities carried out under this
 24 section. At a minimum such evaluations shall use a com-
 25 mon set of benchmarks and assessment tools to identify best

1 *practices and materials developed and demonstrated with*
 2 *funds provided under this section.*

3 (2) *The results of the evaluations required under this*
 4 *subsection shall be made available to the public, including*
 5 *through the National Science, Mathematics, Engineering,*
 6 *and Technology Education Digital Library, and shall be*
 7 *provided to the Committee on Science of the House of Rep-*
 8 *resentatives and the Committee on Health, Education,*
 9 *Labor, and Pensions of the Senate.*

10 (3) *Materials developed under the program established*
 11 *under this section that are demonstrated to be effective shall*
 12 *be made available through the National Science, Mathe-*
 13 *matics, Engineering, and Technology Education Digital*
 14 *Library.*

15 (f) *AUTHORIZATION OF APPROPRIATIONS.—There are*
 16 *authorized to be appropriated to the National Science*
 17 *Foundation to carry out this section \$50,000,000 for each*
 18 *of fiscal years 2002 through 2004.*

19 **SEC. 4. DISSEMINATION OF INFORMATION ON REQUIRED**
 20 **COURSE OF STUDY FOR CAREERS IN**
 21 **SCIENCE, MATHEMATICS, ENGINEERING, AND**
 22 **TECHNOLOGY EDUCATION.**

23 (a) *IN GENERAL.—The Director of the National*
 24 *Science Foundation shall, jointly with the Secretary of*
 25 *Education, compile and disseminate information (includ-*

1 *ing through outreach, school counselor education, and vis-*
 2 *iting speakers) regarding—*

3 *(1) typical standard prerequisites for middle*
 4 *school and high school students who seek to enter a*
 5 *course of study at an institution of higher education*
 6 *in science, mathematics, engineering, or technology*
 7 *education for purposes of teaching in an elementary*
 8 *or secondary school; and*

9 *(2) the licensing requirements in each State for*
 10 *science, mathematics, engineering, or technology ele-*
 11 *mentary or secondary school teachers.*

12 *(b) AUTHORIZATION OF APPROPRIATIONS.—There are*
 13 *authorized to be appropriated to the National Science*
 14 *Foundation to carry out this section \$5,000,000 for each*
 15 *of fiscal years 2002 through 2004.*

16 **SEC. 5. REQUIREMENT TO CONDUCT STUDY EVALUATION.**

17 *(a) STUDY REQUIRED.—The Director of the National*
 18 *Science Foundation shall enter into an agreement with the*
 19 *National Academies of Sciences and Engineering under*
 20 *which the Academies shall review existing studies on the*
 21 *effectiveness of technology in the classroom on learning and*
 22 *student performance, using various measures of learning*
 23 *and teaching outcome including standardized tests of stu-*
 24 *dent achievement, and explore the feasibility of one or more*
 25 *methodological frameworks to be used in evaluations of tech-*

1 *nologies that have different purposes and are used by schools*
 2 *and school systems with diverse educational goals. The*
 3 *study evaluation shall include, to the extent available, infor-*
 4 *mation on the type of technology used in each classroom,*
 5 *the reason that such technology works, and the teacher*
 6 *training that is conducted in conjunction with the tech-*
 7 *nology.*

8 (b) *DEADLINE FOR COMPLETION.*—*The study evalua-*
 9 *tion required by subsection (a) shall be completed not later*
 10 *than one year after the date of the enactment of this Act.*

11 (c) *DEFINITION OF TECHNOLOGY.*—*In this section, the*
 12 *term “technology” has the meaning given that term in sec-*
 13 *tion 3113(11) of the Elementary and Secondary Education*
 14 *Act of 1965 (20 U.S.C. 6813(11)).*

15 (d) *AUTHORIZATION OF APPROPRIATIONS.*—*There are*
 16 *authorized to be appropriated to the National Science*
 17 *Foundation for the purpose of conducting the study evalua-*
 18 *tion required by subsection (a), \$600,000.*

19 **SEC. 6. SCIENCE, MATHEMATICS, ENGINEERING, AND TECH-**
 20 **NOLOGY BUSINESS EDUCATION CON-**
 21 **ERENCE.**

22 (a) *IN GENERAL.*—*Not later than 180 days after the*
 23 *date of the enactment of this Act, the Director of the Na-*
 24 *tional Science Foundation shall convene the first of an an-*
 25 *nual 3- to 5-day conference for kindergarten through 12th*

1 *grade science, mathematics, engineering, and technology*
2 *education stakeholders, including—*

3 *(1) representatives from Federal, State, and local*
4 *governments, private industries, private businesses,*
5 *and professional organizations;*

6 *(2) educators;*

7 *(3) science, mathematics, engineering, and tech-*
8 *nology educational resource providers;*

9 *(4) students; and*

10 *(5) any other stakeholders the Director deter-*
11 *mines would provide useful participation in the con-*
12 *ference.*

13 *(b) PURPOSES.—The purposes of the conference con-*
14 *vened under subsection (a) shall be to—*

15 *(1) identify and gather information on existing*
16 *science, mathematics, engineering, and technology*
17 *education programs and resource providers, including*
18 *information on distribution, partners, cost assess-*
19 *ment, and derivation;*

20 *(2) determine the extent of any existing coordi-*
21 *nation between providers of curricular activities, ini-*
22 *tiatives, and units; and*

23 *(3) identify the common goals and differences*
24 *among the participants at the conference.*

1 (c) *REPORT AND PUBLICATION.*—*At the conclusion of*
 2 *the conference the Director shall—*

3 (1) *transmit to the Committee on Science of the*
 4 *House of Representatives and to the Committee on*
 5 *Commerce, Science, and Transportation of the Senate*
 6 *a report on the outcome and conclusions of the con-*
 7 *ference, including an inventory of curricular activi-*
 8 *ties, initiatives, and units, the content of the con-*
 9 *ference, and strategies developed that will support*
 10 *partnerships and leverage resources; and*

11 (2) *ensure that a similar report is published and*
 12 *distributed as widely as possible to stakeholders in*
 13 *science, mathematics, engineering, and technology*
 14 *education.*

15 (d) *AUTHORIZATION OF APPROPRIATIONS.*—*There are*
 16 *authorized to be appropriated to the National Science*
 17 *Foundation to carry out this section—*

18 (1) *\$300,000 for fiscal year 2002; and*

19 (2) *\$200,000 for each of fiscal years 2003 and*
 20 *2004.*

21 **SEC. 7. DISTANCE LEARNING GRANTS.**

22 (a) *IN GENERAL.*—*The Director of the National*
 23 *Science Foundation shall establish a program to award*
 24 *competitive, merit-based grants to institutions of higher*
 25 *education to provide distance learning opportunities in*

1 *mathematics or science to elementary or secondary school*
2 *students.*

3 (b) *USE OF FUNDS.*—*Grants awarded under this sec-*
4 *tion shall be used by institutions of higher education to es-*
5 *tablish programs under which elementary or secondary*
6 *school students can participate in research activities in*
7 *mathematics or science occurring at the grantees' institu-*
8 *tion via the Internet.*

9 (c) *SELECTION PROCESS.*—(1) *An institution of high-*
10 *er education seeking funding under this section shall submit*
11 *an application at such time, in such manner, and con-*
12 *taining such information as the Director may require. The*
13 *application shall include, at a minimum—*

14 (A) *a description of the research opportunities*
15 *that will be offered;*

16 (B) *a description of how the applicant will pub-*
17 *licize these research opportunities to schools and*
18 *teachers;*

19 (C) *a description of how the applicant will in-*
20 *volve teachers of participating students in the pro-*
21 *gram;*

22 (D) *a description of how students will be selected*
23 *to participate;*

24 (E) *a description of how the institution of higher*
25 *education will ensure that the research is enhancing*

1 *the participants' education and will make it more*
 2 *likely that the participants will continue their studies*
 3 *in mathematics or science; and*

4 *(F) a description of how the funds will be spent.*

5 *(2) In evaluating the applications submitted under*
 6 *this subsection, the Director shall consider—*

7 *(A) the ability of the applicant to effectively*
 8 *carry out the proposed program;*

9 *(B) the extent to which the proposed program*
 10 *will enhance the participants' education and encour-*
 11 *age them to continue the study of mathematics or*
 12 *science; and*

13 *(C) the extent to which the proposed program*
 14 *will provide opportunities that would not otherwise be*
 15 *available to students.*

16 *(3) The Director shall ensure, to the extent practicable,*
 17 *that the program established under this section serves stu-*
 18 *dents in a wide range of geographic areas and in rural,*
 19 *suburban, and urban schools.*

20 *(d) AUTHORIZATION OF APPROPRIATIONS.—There are*
 21 *authorized to be appropriated to the National Science*
 22 *Foundation to carry out this section \$5,000,000 for each*
 23 *of the fiscal years 2002 through 2004.*

24 **SEC. 8. DEFINITIONS.**

25 *In this Act:*

1 (1) *The term “elementary school” has the mean-*
2 *ing given that term by section 14101(14) of the Ele-*
3 *mentary and Secondary Education Act of 1965 (20*
4 *U.S.C. 8801(14)).*

5 (2) *The term “secondary school” has the mean-*
6 *ing given that term by section 14101(25) of the Ele-*
7 *mentary and Secondary Education Act of 1965 (20*
8 *U.S.C. 8801(25)).*

9 (3) *The term “institution of higher education”*
10 *has the meaning given that term by section 101 of the*
11 *Higher Education Act of 1965 (20 U.S.C. 1001).*

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H. R. 100

[Report No. 107–133, Part I]

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The Committee on Education and the Workforce discharged; committed to the Committee of the Whole House on the State of the Union and ordered to be printed